

Essentials of Proper Chemical Storage

Proper storage and handling of hazardous chemicals can reduce the risks of fire, explosion, or toxic exposure. These risks are as great in the storage area as they are in the work area. In fact, storage areas usually contain more hazardous chemicals, and more diverse ones, than the work area—creating even greater risks of leaks and incompatibility. That diversity also makes ignorance or carelessness in handling the chemicals extremely dangerous.

No chemical, no matter how small the quantity can be taken lightly. It is a good idea to restrict storage area access to people who understand the hazards and can take proper precautions. Everyone who does have access to the storage area—including receiving personnel—must know how to find and use the safety information on labels and material safety data sheets (MSDS's). They should also be aware of some commonsense guidelines of safe chemical storage.

Incompatible Chemicals

One of the biggest risks in chemical storage is haphazard arrangement of incompatible chemicals—chemicals that can react together to create toxic smoke, gas, heat, mists, fire, or explosion. Luckily, you do not have to be a chemist to know which chemicals to keep away from each other. Their MSDS's will tell you that. But every employee with access to the storage area must recognize the risks of incompatibles and always check the MSDS before storing a chemical to be sure no dangerous reactions are possible.

There are several types of chemicals that require particular caution:

- Organic oxidizers that come in contact with combustible materials can cause them to burn or increase their burning rate. Some can even explode when exposed to heat, shock, or friction. Therefore, storage areas must clearly identify and label oxidizers so as to indicate the type and degree of hazard.
- Inorganic oxidizers, which do not contain carbon, are even more common. While they do not burn, they add oxygen to the fire and are particularly dangerous when brought together with organic materials. Therefore, they must be kept away from any material that could burn, as well as from other oxidizers. Large quantities of inorganic oxidizers may have to be stored in a separate room with specific fire-protection requirements.
- Acids, which may be oxidizers, can create toxic emissions or fires if they react with bases, active metals, flammable and combustible material, and with other chemicals. Acids in containers that have been transported may also have Department of Transportation “corrosive” warning labels.
- Bases, materials that are soluble in water and produce hydroxide ions in solution, have to be kept separate from acids.
- Flammable materials have to be kept away from oxidizers, oxidizing acids, and any source of ignition.

Selecting Containers for Storage

Keeping incompatibles away from each other is just one necessity in a hazardous-chemical storage area. Another is being sure that chemicals are stored in appropriate containers. Flammable liquids, for instance, must be kept in approved fireproof or fire-resistant safety containers—not plastics—and checked regularly for leaks. In many cases, the flammable containers may have to be kept in safety cabinets that meet National Fire Protection Association (NFPA) fireproofing standards. Large quantities of flammable liquids will probably be stored in drums, which should be grounded to prevent the possibility of fire when the liquid is removed.

You can also improve safety by thinking about the placement of hazardous chemical containers.

- Keep large bottles of acids on low shelves so they are easier to get to.
- Keep containers holding liquid bases on lower shelves than bases in dry form.
- Store drums individually, not in stacks, on racks with other similar materials.
- In earthquake-prone areas, special protection may be needed to ensure glass bottles do not break.

Handle Stored Chemicals Sensibly

Placement of chemicals is just one aspect of storage safety. It is just as important to take precautions when moving or transferring the substances. For example, it is a good idea to avoid taking chemicals through areas that contain incompatibles. In addition, anyone who handles chemical containers should follow these precautions:

- Wear the appropriate gloves and other personal protective equipment (PPE) recommended on the MSDS.
- Check containers regularly for leaks, wear, complete labels, and dates. Report any problems immediately.
- Do not use anything from an unlabeled container.
- Keep containers closed when not in use—and take only what you need for a job.
- Do not siphon by mouth.
- Use bonding and grounding connections on flammable liquid containers during transfer.
- Transport acid bottles in carriers, not by hand.
- Do not mix chemicals with each other or any substance (even water) with specific instructions to do so.
- Keep storage areas clean, neat, and free of dust.
- Do not block aisles, exits, sprinklers, or firefighting equipment.

Plan for Emergency Response

Storage areas should be designed to minimize risk and make response to emergencies easier. You reduce the risks by making sure that the area is well-ventilated and sufficiently well-lighted to make it easy to read labels and rack and shelf identification.

The floor should be of material—like concrete, for example—that will not absorb liquids. Be sure that your storage area is also equipped to allow you to respond quickly to emergencies. That means easy access for emergency personnel and equipment. In addition, there should be at least 18 inches clearance between stored materials and sprinklers—36 inches if you are storing very flammable material.

To be prepared for an emergency, you should also have:

- A copy of your emergency response plan
- Material safety data sheets (MSDS's) with emergency response guidelines for the chemicals stored
- An eyewash that can be reached within 10 seconds from the areas where acids and bases are stored
- An emergency shower
- Firefighting and spill cleanup equipment.

CHEMICAL STORAGE SAFETY CHECKLIST

DO:

- Check MSDS's before storing or removing a chemical. Find out if it must be kept away from anything (light, water, air, high or low temperatures, or other chemicals) to prevent a dangerous reaction.
- Store chemicals at appropriate temperatures, e.g. aqueous solutions should be stored so that they do not freeze.
- Organize storage areas so chemicals do not have to be taken through areas containing incompatibles.
- Store chemicals no higher than eye level and never on the top shelf of a storage unit.
- Store acids in a dedicated acid cabinet. Nitric acid may be stored there also, if it is kept isolated from the others.
- Store severe poisons in a dedicated poison cabinet.
- Ensure that the shelves of a storage cabinet have an anti-roll lip.
- Keep at least 18 inches between stored materials and sprinklers—36 inches if you are storing very flammable material.
- Close containers as soon as you have removed quantities you need.
- Wear the correct PPE when handling hazardous chemicals. Check the MSDS for instructions. Wear the correct gloves and safety goggles even if handling closed containers.
- Use bonding and grounding connections on flammable-liquid drums and small receptacles during transfer.
- Transport acid bottles in carriers, not by hand.
- Clean up even the smallest leaks promptly and properly.
- Check containers regularly for leaks or wear and report any problems immediately.
- Check containers regularly to see if any are outdated or never used. Ask your supervisor if such chemicals can be disposed of properly.

- Always label and date all containers; report any container that does not have a label and date.
- Keep packing materials such as straw or paper in a fire-resistant room equipped with a sprinkler system.
- Keep the work area clean, neat, and dust-free.
- Keep cyanides and sulfides away from acids.

DO NOT:

- Store chemicals in alphabetical order. Once segregated by hazard class, chemicals may be stored alphabetically.
- Purchase chemicals in quantities greater than can be used in the specified storage time period.
- Take more from a hazardous chemical container than you need for the job.
- Use or remove anything from a container that does not have a label.
- Store hazardous chemicals near heat or strong sunlight; they might expand and cause a fire or explosion.
- Stack materials so they block exits, firefighting equipment, alarms, or sprinklers.
- Smoke anywhere near the storage area.
- Siphon by mouth.
- Mix chemicals with each other or with any substance (even water) without specific instructions to do so.
- Mix acids and water.
- Leave used flammable liquids containers near heat sources.
- Use containers that are not designed for chemical storage, e. g. soda cans, soda bottles, etc.